

Appl. No. 09/975,682
Amdt. dated June 1, 2006
Reply to Office Action of February 15, 2006

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Please cancel claims 6, 8, 12, 14-18 without prejudice, amend claims 1, 2, 7, 11, 13, and 23, and add new claims 24-33 as follows:

1. (Currently amended): Method for reducing cross-talk in a communication system comprising a plurality of transmitters for transmitting encoded data signals via respective communications channels to a plurality of receivers and receiving back matrix updating information, said method comprising the steps of:

processing ~~encoded training~~ data signals ~~from in the plurality of a transmitters-transmitter~~ utilizing at least one an initial pre-coding matrix to produce a first pre-coded training signal;

~~communicating-transmitting~~ said first pre-coded training signal ~~to on a respective~~ first communication channel; and

~~adapting said at least one pre-coding matrix in response to an impairment indicative~~ signal;

receiving from the first communication channel the matrix updating information computed at a receiver on the other end of the first communication channel, the matrix updating information having been computed utilizing the transmitted first pre-coded training signal and a second pre-coding matrix located at the receiver; and

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updating said initial pre-coding matrix based on said matrix updating information,
whereby said processing-updating tends to offset channel impairments within said first
communications communication channel.

2. (Currently amended): The method of claim 1, ~~further comprising the steps of:~~
~~receiving said first pre-coded signal from said first communications channel; and~~
wherein the matrix updating information is generated in generating said receiver based on
an impairment indicative signal in response to a determination of a channel impairment level of
said first ~~communications communication~~ channel.

3. (original): The method of claim 2, wherein said impairment indicative signal is
determined according to a least mean square (LMS) algorithm.

4. (Previously presented): The method of claim 1, wherein signals propagated via
each of said communications channels comprise a respective set of in-phase (I) and quadrature
(Q) signals forming carrierless amplitude and phase (CAP) modulated signals.

5. (Previously presented): The method of claim 1, wherein signals propagated via
each of said communications channels comprise a respective set of in-phase (I) and quadrature
(Q) signals forming quadrature amplitude modulated (QAM) signals.

6. (Canceled)

7. (Currently amended): The method of claim 4, wherein said step of adapting-
updating comprises the steps of:

increasing an amplitude level of at least on respective set of said I and Q signals; and

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repeating said steps of processing, ~~transmitting, and communicating-receiving~~ until an impairment indicative signal level is less than a threshold level.

8. (Canceled)

9. (Previously presented): The method of claim 8, wherein each of said ~~N-plurality~~ of transmitters processes ~~an encoded training data signal~~ signals utilizing ~~a-an~~ initial pre-coding matrix in each transmitter, ~~each pre-coding matrix processing encoded data signals from the other transmitters.~~

10. (Previously canceled)

11. (Currently amended): The method of claim 8, wherein:

each of said ~~N-plurality of~~ transmitters performs ~~the a~~ step of selecting initial parameters for its respective initial pre-coding matrix prior to ~~processing-transmitting said first pre-coded training signal~~ a-respective encoded data signal, said selected initial parameters tending to offset channel impairments of said respective communications channels, ~~said step of selecting comprising the steps of:~~

~~propagating a pre-defined training sequence via a respective communications channel;~~

~~receiving said pre-defined training sequence from said respective communications channel; and~~

~~determining initial parameters of said at least one pre-coding matrix, using said received pre-defined training sequence, to adapt to said channel impairments of said respective communications channel.~~

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12. (Canceled)

13. (Currently amended): The method of claim ~~11~~ 1, further comprising the step of training an equalizer to reduce channel-specific impairments ~~from said received pre-defined training sequence prior to selecting said initial pre-coding matrix parameters within said first communication channel.~~

14-18 (Canceled)

19-22. (Previously canceled)

23. (Currently amended): Apparatus for reducing cross-talk in a communications system comprising a plurality of transmitters for transmitting encoded data signals via respective communications channels to a plurality of receivers and receiving back matrix updating information, said apparatus comprising:

means for processing ~~encoded training data signals from in the plurality of a transmitters-transmitter~~ utilizing ~~at least one an initial~~ pre-coding matrix to produce a first pre-coded training signal;

means for ~~communicating-transmitting~~ said first pre-coded training signal to on a ~~respective first communications-communication~~ channel; and-

~~means for adapting said at least one pre-coding matrix in response to an impairment-indicative signal;~~

means for receiving from the first communication channel the matrix updating information computed at a receiver on the other end of the first communication channel, the

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matrix updating information having been computed utilizing the transmitted first pre-coded training signal and a second pre-coding matrix located at the receiver; and
means for updating said initial pre-coding matrix based on said matrix updating information, whereby said processing updating tending tends to offset channel impairments within said first communications communication channel.

24. (new): Method for reducing cross-talk in a communication system comprising a plurality of receivers for receiving encoded data signals via respective communications channels from a plurality of transmitters and transmitting back matrix updating information, said method comprising the steps of:

receiving in a receiver a first pre-coded training signal from a first communication channel;

processing the first pre-coded training signal in the receiver utilizing a first pre-coding matrix located in the receiver to produce the matrix updating information; and

transmitting on the first communication channel the matrix updating information computed at the receiver for utilization by a transmitter on the other end of the first communication channel to update a second pre-coding matrix located in the transmitter based on said matrix updating information.

25. (new): The method of claim 24, further comprising the step of:

generating the matrix updating information in said receiver based on an impairment indicative signal in response to a determination of a channel impairment level of said first communication channel.

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26. (new): The method of claim 25, wherein said impairment indicative signal is determined according to a least mean square (LMS) algorithm.

27. (new): The method of claim 24, wherein signals propagated via each of said communications channels comprise a respective set of in-phase (I) and quadrature (Q) signals forming carrierless amplitude and phase (CAP) modulated signals.

28. (new): The method of claim 24, wherein signals propagated via each of said communications channels comprise a respective set of in-phase (I) and quadrature (Q) signals forming quadrature amplitude modulated (QAM) signals.

29. (new): The method of claim 25, further comprising the step of:
determining the impairment indicative signal in the receiver using said first pre-coded training signal and a receiver copy of the first pre-coded training signal.

30. (new): The method of claim 27, wherein said step of updating comprises the steps of:

increasing an amplitude level of at least on respective set of said I and Q signals; and
repeating said steps of receiving, processing, and transmitting until an impairment indicative signal level is less than a threshold level.

31. (new): The method of claim 24, wherein each of said plurality of receivers processes a pre-coded training signal utilizing a first pre-coding matrix in each receiver.

32. (new): The method of claim 24, wherein:
each of said plurality of receivers performs a step of selecting initial parameters for its respective first pre-coding matrix prior to receiving said pre-coded training signal, said selected

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initial parameters tending to offset channel impairments of said respective communications channels.

33. (new): The method of claim 24, further comprising the step of training an equalizer to reduce channel-specific impairments within said first communication channel.